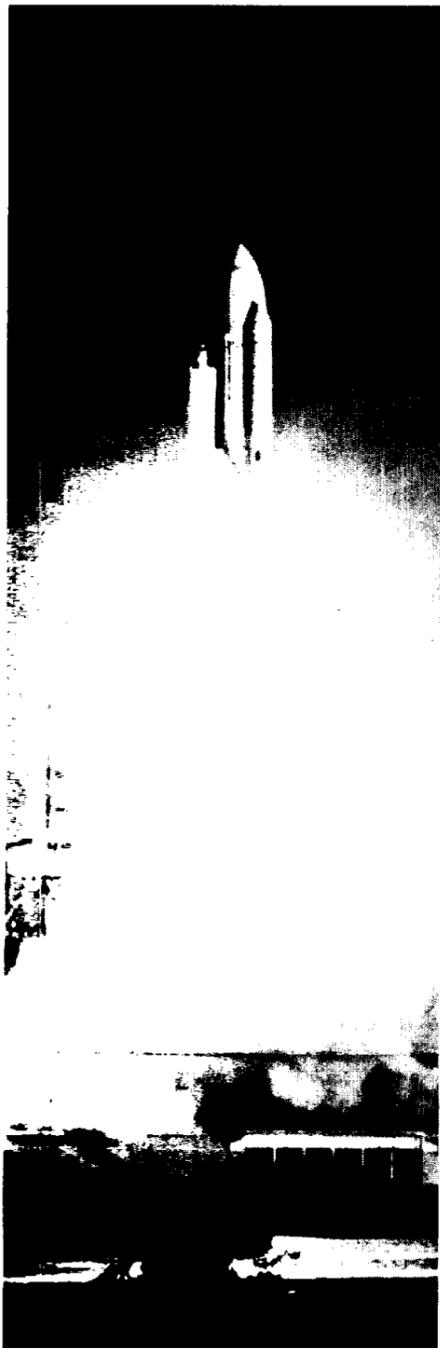


Space News Roundup



Waiting for a Replay
Eyes remain focused on launch pad 39A awaiting a repeat of the spectacular first launch of Space Shuttle Columbia.

Shuttle Update

Spill Delays Launch Date

A spill of highly corrosive oxidizer during the early morning hours September 22 at the Kennedy Space Center damaged the Space Shuttle Orbiter Columbia and delayed the planned October 9 launch date.

Estimates a few days after the accident were that the launch would take place in late October or early November. A firm date is expected to be announced in about a week.

The incident which damaged the orbiter occurred as technicians were preparing Columbia for her second flight, then just two and a half weeks away, by loading hypergolic propellants into the forward Reaction Control System module. Nitrogen tetroxide, the highly corrosive substance which ignites on contact with

hydrazine, the RCS fuel, spilled down the starboard side of the orbiter when a quick disconnect valve failed to seat properly.

About three gallons flowed down the ship's flank, seeping between tiles and essentially melting the RTV "glue" used to hold the thermal protection tiles in place. Many of the tiles came off easily in the hands of technicians cleaning up the spill. Over 350 were finally removed from the vehicle as engineers sought to find the limits of the damage.

Additionally, some of the oxidizer flowed into the RCS module, a circumstance that some feared would require rolling the vehicle back to the VAB, demating, and towing Columbia back to the Orbiter Processing

Facility. That could have added two months or more to the schedule.

But the path of the oxidizer into the module was such that most of it was absorbed by the thermal blankets in the unit. About 15 of these were removed. By Roundup publication time, it appeared that all work could be done on the pad, a considerable time savings. A more detailed assessment of the work remaining and a new launch date are expected to be announced shortly.

Other major milestones in the pre-launch event schedule had been completed successfully including Countdown Demonstration Tests and the Cryogenic Loading Test. No problems developed with the External Tank insulation following cryo loading as in STS-1.

NASA-Developed Winglets Promise to Reduce Commercial Air Transport Fuel Consumption

Winglets — NASA-developed air foils designed to increase the fuel efficiency of airplanes — are being test-flown aboard a wide-body commercial aircraft.

Winglets are a part of NASA's Aircraft Energy Efficiency Program, aimed at developing advanced technologies that could reduce fuel consumption by 50 percent in new air transports.

Aeronautical research is the focus at four NASA centers: Langley Research Center, Hampton, Va.; Ames Research Center, Mountain View, Calif.; Dryden Flight Research Center, Edwards, Calif. and Lewis Research Center, Cleveland.

Winglets are small, wing-like structures attached to the tips of an airplane wing, almost perpendicular to the wing surface.

They cut fuel-consuming drag in aircraft by lessening the effect of wingtip vortices, the turbulent swirls of air that form at the wingtips of all aircraft in flight.

The test plane, a DC-10 Series 10 jetliner leased from Continental Airlines, has two winglets attached to each wingtip: a 3.2 meter (10.5-foot) winglet is atop the wing, pointing upward; a 0.8 m (2.5-ft.) one is attached beneath the wing and pointing downward.

The test program is being conducted by the McDonnell Douglas Corp. under a contract with Langley Research Center. Early flight tests have been made at Dryden Flight Research Center; later tests are being flown at a Douglas development facility at Yuma, Ariz.

Based on wind tunnel tests, a fuel

reduction of about 3 percent is expected with the DC-10 winglets. That amounts to an annual savings per plane of about 250,000 gallons of fuel, now priced at more than one dollar a gallon. A successful test program could lead to the use of winglets on all DC-10 commercial aircraft.

The winglet concept was developed by Dr. Richard T. Whitcomb, recently retired Langley aeronautical designer. They have been tested on several kinds of small aircraft, but never before on a plane as large as the DC-10. Winglets are already in commercial use on the Gates Learjet 55 (called the "Longhorn") and the Grumman Gulfstream III.

Winglets reduce lift-induced drag, which accounts for about 40 percent of the total drag on an aircraft at cruising speed and altitude. Lift-induced drag is produced by the same aerodynamic forces that provide the lift that keeps an airplane in the air.



Ready for takeoff

STS-2 commander Joe Engle and his son Jon L. prepare to prop start the engine on their newly restored WWII vintage aircraft. Engle acquired the L-4 craft and set out to refurbish it to a condition as closely as possible to its original form. After sending the serial number to former Astronaut Michael Collins, then director of the National Air and Space Museum, he was able to duplicate the plane down to the original paint scheme. Engle is conducting flying lessons in the two-seater plane for Jon at Friendswood's Clover Field.

George Griffith Dies Sept. 25

George Griffith, Chief of the Structural Test Branch at JSC until his retirement last March, died September 25. He was 66.

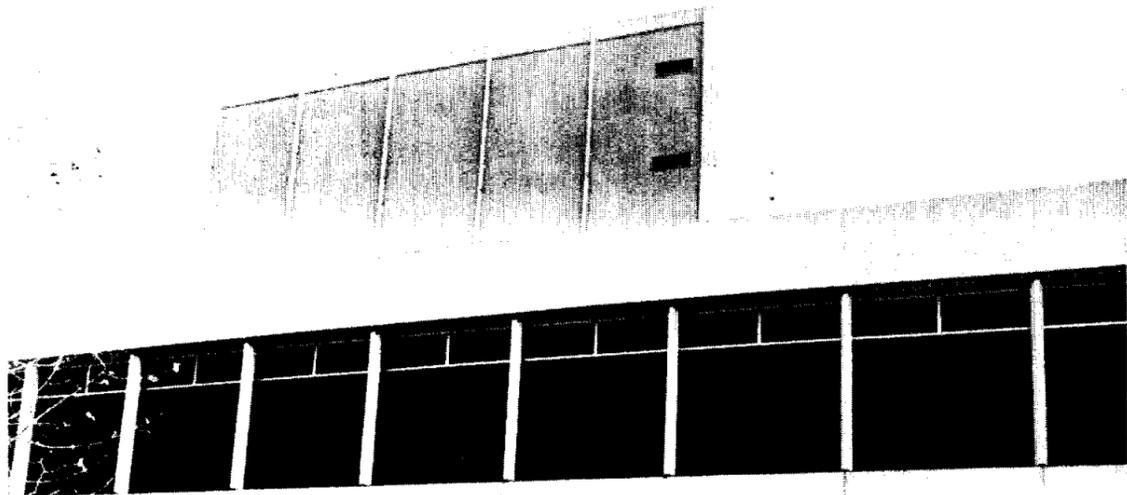
He began his career as a civil engineer for the National Advisory Committee on Aeronautics (NACA) at Langley Field, Virginia, March 23, 1944. During his 37 years of government service, he was associated with virtually all aspects of analysis, testing, and development of spacecraft structures, materials, and thermal protection systems.

As chief of the Structural Test Branch, he directed major structural and thermal test programs for the Apollo, Skylab, Apollo-Soyuz and Space Shuttle spacecraft.

Griffith was awarded the NASA Exceptional Service Medal earlier in September for his work in the Shuttle program.

He is survived by his wife, Ernie, of El Lago, two sons and three daughters.

Bulletin Board



Going Out of Business

This "For Rent" sign mysteriously appeared recently in front of Building 32, the Space Environment Simulation Laboratory. The facility with its huge vacuum chambers used for testing hardware in near-space conditions, is being closed down temporarily as a money saving measure.

Student Pilot Instrument Training Device Developed at NASA Wallops Flight Center

A new concept for training student pilots in the performance of instrument flight rules procedures has been developed by engineers at NASA's Wallops Flight Center, Wallops Island, Va.

Current government regulations require general aviation pilots seeking certification to operate aircraft under instrument flight rules conditions to complete a minimum number of hours of instructional flying by procedures applicable to these rules. Nearly always this involves significant expenditures of time and money as generally only major airfields have the required electronic navigational aids, and often such airfields are remote from the student pilot's location. Also, normal air traffic density and mix (student pilots training in small

aircraft together with commercial air carriers) cause delays in completing training exercises.

An existing table-top flight simulator was extensively modified for installation in a typical general aviation aircraft to provide simulated instrument flight conditions independent of ground-based navigation aids. This hybrid system is dependent primarily on electri-

New Delights In Dining

Have you visited the Building 3 Cafeteria since the renovations were completed? If not, here are some of the *new additions* to the large menu variety already available.

The *French Dip Sandwich* (a big success) has 3 oz. thin sliced roast beef on a fresh hogie, quarter pickle, horseradish cream, served with a cup of au jus — *delicious!* (Also a *salad bar*. All you can eat for \$2.00 — lettuce, tomatoes, three bean salad, fresh mushrooms, chopped eggs, beets, red onions, cauliflower, cheese, croutons and more with your favorite dressings.

Each Wednesday features the *Reuben Sandwich*. Delicious hot corned beef with swiss cheese and sauerkraut on rye. These new items are available only in Building 3. Interested? Try your *new* cafeteria soon.

cal signals derived from the actual airspeed, altitude and heading of the training aircraft.

In addition to air traffic control voice simulation, the device presents a standard very high frequency omnirange, automatic direction finding, distance measuring equipment and instrument landing system indications to the student pilot and instructor on simulator driven instruments. Training can be conducted at safe altitudes away from normal traffic areas. Scenarios provided can include elementary procedures, such as holding patterns or very high frequency omnirange navigation practice through full instrument flight rules procedures flights for selected airports.

The radio-navigation-related panel instruments of the ground-based simulator were installed in a Cessna 172 for test flights and evaluation at the Wallops airport. Observers from NASA's Langley Research Center, Hampton, Va.; Airplane Owners and Pilots Association; General Aviation Manufacturing Association; Analog Training Computers, Inc. (the simulator manufacturer); and the Federal Aviation Agency who flew with the Wallops pilots stated they could not tell the difference between the simulated approach demonstrated and those encountered at actual airports.

J. Brad Aaron is the Wallops project manager and Gerald G. Morris is the project engineer.

Project Mercury Reunion

A reunion picnic for all persons who worked on Project Mercury is scheduled for October 24 at the Kennedy Space Center, Florida. The picnic will be held at Kars Park, Complex 99. For information, contact Deke Slayton or Ron Kubicki at ext. 5934.

Special Christmas Cards

Christmas cards designed by the children at M.D. Anderson Hospital and Tumor Institute, University of Texas System Cancer Center, are being sold again this year. Cards are being sold for \$5 for a box of 20 cards. Proceeds go to benefit children with cancer. For information or to order call Stella Kiefer at 488-4080, Betty Conklin at 486-4193, or Marty Moore at 482-4215. Cards also will be on sale on Thursdays, Fridays and Saturdays beginning November 5 at the Sakowitz store in the Ports of Call Mall.

Arts and Crafts Sale

An arts and crafts sale open to all NASA and contractor employees will be held October 24 at the Gilruth Recreation Center. The sale will be held from 9 a.m. to 3 p.m. Cost of a table to display your work is \$2. For more information call ext. 3944.

UH/CLC Orchestra

Season tickets for five concerts of the University of Houston Clear Lake Community Orchestra are now on sale. General admission tickets for the five concerts are \$12, student/senior citizen tickets are \$4. Call W. F. Meek at extension 4851 or 334-3092 for more information.

Bicycle Club

The JSC Bicycle Club conducted its first Century Ride of 100 miles September 20. Thirty persons participated starting from UH/CLC and travelling to Dickinson, Angleton, Alvin and back to UH/CLC. All 16 of the hundred-mile riders completed the course in under 10 hours. Eleven people rode 50 miles and three riders went 25 miles.

September was designated National Century Ride Month by the League of American Wheelmen, a national bicycling association. All participants in the JSC Bike Club completed their rides in the required time

limit and are eligible for patches awarded by the League which describe their accomplishments.

NARFE MEETING SET

The regular monthly meeting of chapter 1321 of the NATIONAL ASSOCIATION OF RETIRED FEDERAL EMPLOYEES will be held on Friday, October 9 at 1 p.m. in the Clear Lake Park Building, NASA Rd. 1.

Burney Goodwin will review the history and the restoration of the clipper ship, Elissa, which was built at Aberdeen, Scotland in 1877. The Galveston Historical Society and volunteers are restoring the Elissa. It will serve as a Marine Museum of early shipping at the Port of Galveston.

Refreshments will be served. Visitors are welcome. For more information, call Burney Goodwin at 334-2494.

Golf Association

The JSC Golf Association has completed seven of its eight competitive tournaments for 1981. Winners at Newport, played August 29, were Bob Allen (net 69), Max Engert (70), Jerry Shinkle (71), and Bill Fullbright (72) in Flight I, and Larry Keyser (65), Ernie Robertson (66), Brad McPherson (68), and Al Ligrani (69) in Flight II.

Playing Lake Houston on September 19, the Flight I winners were Ted Breezy (69), Al McIntyre (72), Tom Hickey (73), and Jack Kaneshiro (73). Flight II winners were Harry Kolkhorst (72), Cal Mitchell (75), Bill Miller (76), and Larry Magers (77).

The last regular tournament will be played at Atascocita on Monday, October 12.



People Helping People
The United Way

JSC EXCHANGE STORE (Hours 10 a.m. to 2 p.m.)

Plitt Theatre Tickets \$2.25 each
General Cinema Tickets \$2.40 each
Astroworld/Six Flags Tickets \$9.50 each
Postage Stamps/18 cents
Books \$3.60 each.

Cookin' in the cafeteria

Week of October 5-9, 1981

Monday: French Onion Soup; BBQ Sliced Beef; Parmesan Steak; Spare Rib w/Kraut; Chili & Macaroni (Special); Ranch Style Beans, English Peas, Mustard Greens. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Meatballs & Spaghetti; Liver & Onions; Baked Ham w/Sauce; Corned Beef Hash (Special); Buttered Cabbage, Cream Style Corn, Whipped Potatoes.

Wednesday: Seafood Gumbo; Cheese Enchiladas; Roast Pork w/Dressing; BBQ Link (Special); Pinto Beans, Spanish Rice, Turnip Greens.

Thursday: Beef & Barley Soup; Roast Beef w/Dressing; Fried Perch; Lasagne w/Meat; Chopped Sirloin; Chicken Fried Steak (Special); Whipped Potatoes, Peas & Carrots. Buttered Squash.

Friday: Seafood Gumbo; Fried Shrimp; Baked Fish; Beef Stroganoff; Fried Chicken (Special); Okra & Tomatoes, Buttered Broccoli, Carrots in Cream Sauce.

Week of October 12-16, 1981

Monday: Holiday

Tuesday: Navy Bean Soup; Beef Stew; Liver w/Onions; Shrimp Creole; Smothered Steak w/Dressing (Special); Corn, Rice, Cabbage, Peas.

Wednesday: Seafood Gumbo; Roast Beef; Baked Perch; Chicken Pan Pie; Salmon Croquette (Special); Mustard Greens, Italian Green Beans, Sliced Beets.

Thursday: Beef & Barley Soup; Beef Tacos; Diced Ham w/Lima Beans; Stuffed Cabbage (Special); Ranch Style Beans, Brussels Sprouts, Cream Style Corn.

Friday: Seafood Gumbo; Fried Shrimp; Deviled Crabs; Ham Steak; Salisbury Steak (Special); Buttered Carrots, Green Beans, June Peas.

* Menu subject to change without notice.

Roundup deadline is the first Wednesday after publication.



The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees.

Fire Prevention Week

United States Tops List in Life, Property Losses

Fire Prevention Week is observed every year during the week in which October 9 falls. This is to commemorate the great Chicago fire which occurred on that date in 1871.

The first official Fire Prevention Week was proclaimed in 1922 by President Harding.

Fire Prevention Week provides an opportunity for all Americans to be reminded of

the yearly toll taken by fire and of ways to prevent fire from occurring. The United States has the dubious honor of having the highest fire loss rates in life and property of any of the in-

dustrialized nations.

In 1979 (the latest year in which statistics are available) 7,780 people died in fires. Of these deaths, 5,765 or 74% occurred in the home. This makes residential fires the country's number one fire problem.

There are several steps you can take to help prevent fires or to reduce their severity:

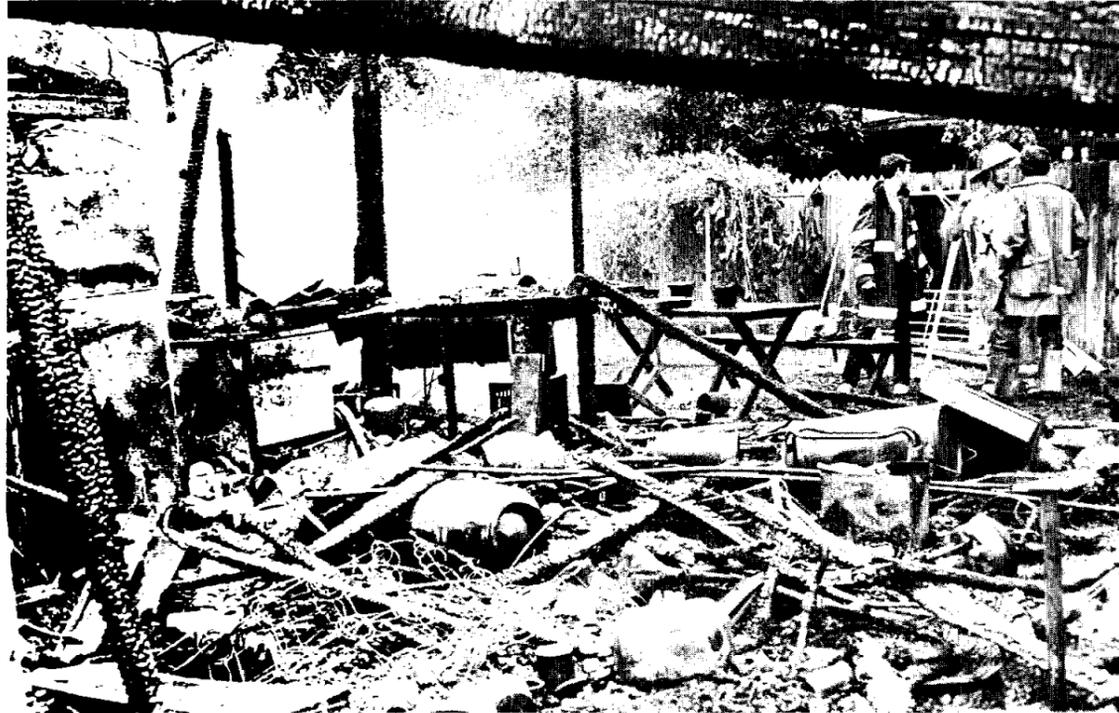
- 1). Make sure all smoking materials are properly extinguished. Fires Started by smoking materials are the most common fatal home fires.
- 2). Make sure areas around heat producing appliances (such as furnaces, hot water heaters, fireplaces, etc.) are kept clear of combustible materials.

3). Have chimneys and flues regularly cleaned and inspected.

4). Install a smoke detector on each level of your home or between the sleeping and living areas in apartments or single story homes.

5). Develop a fire exit plan for your home and discuss it with the rest of the family. It should be practiced in announced and unannounced drills.

The most important step is to develop a fire-safety awareness in yourself and your family. It has often been said that the three main causes of fire are men, women, and children. An awareness of the ever-present threat of fire is an important element in preventing fires at home and on the job.



Fire Reduced This Clear Lake-Area Home to Smoldering Ashes

At Gilruth Rec Center

Children's Movie - Walt Disney's production of "The Great Muppet Caper" will be showing on October 17 and October 18. Shows will be 10:00 a.m. - 12:00 noon on October 17 and 1:00 p.m. - 3:00 p.m. on October 18. Admission is \$1.00 which includes popcorn and coke. Tickets are available at Building 11. For information call x3944.

Defensive Driving - Learn to drive safely and qualify for a 10% reduction in your auto insurance for the next 3 years. Class meets on Saturday, October 31 from 8:00 a.m. to 5:00 p.m. Cost is \$15.00 per person. For information call x3944.

Intermediate Auto Mechanics - Learn to perform your own preventative maintenance and beat inflation. Class meets on Thursdays beginning October

15 from 7:30 - 9:30 p.m. for 4 weeks. Will do minor tunes, etc. Savings in labor alone pays for the cost of this course. The fee is \$33.50. For information call x3944.

Scuba Class - The JSC Scuba Club will offer a 6 week class leading to NAUL certification. Classes meet at the Gilruth Rec Center on Tuesdays from 6:30 - 9:00 p.m. beginning on Sept. 29. Students perform in the pool at La Porte High School. Cost is \$90.00. For information call x3944.

New Tennis Reservations Rules - Reservations will only be accepted from those who are paid. You must come in and pay .75 per person or get on a yearly or quarterly fee. Athletic office number is x3944.

Inter-Center Race - All runners get into training for our

next intercenter race. Events include 10 KM and 2 mile run held here at the Rec Center starting October 13 - 16 at 5:15 p.m. and October 17 at 9:00 a.m. Ribbons go to all finishers and medals to the top three in each category - Local and NASA-wide. Refreshments will be provided. For information call x3944.

Arts and Crafts Sale - Bring all your artistic creations on October 24th at the Gilruth Rec. Center. Will be open to all NASA and contractor employees. Cost is \$2.00 per table, starting at 9:00 a.m. - 3:00 p.m. Concession stand will be open. For more information call x3944.

Basketball Officials - We are in need of basketball officials. If you are interested in calling games, call x3944.

Color-Infrared Photos Help Spot Clogged Irrigation Lines

Researchers are using color-infrared photography to help California Imperial Valley farmers spot clogged drainage lines in irrigated croplands. The techniques being tested should be useful in other irrigated areas such as Europe where farmers rely on similar drainage lines.

Irrigated farmlands can become less productive due to salts deposited by evaporated water. In the Imperial Valley, an intricate system of drainage lines, located 1.8 meters (6 feet) underground, is used to flush out saline water and control the water table below the root zone.

These drainage lines can get clogged because of chemical, bacterial or physical activity, preventing the removal of the saline water.

Researchers from the federal Department of Agriculture (USDA) and NASA's Ames Research Center in Mountain View, Calif., are using aerial color-infrared photography to learn how to

pinpoint these clogged lines before the crops are damaged.

If a clogged drain is discovered before there is any damage to the crops, the drain can be unclogged by using high pressure jet cleaning devices and the crop saved.

NASA aircraft photographed the same drainage lines four times over bare soil last November, five times last June, and once in August, when the crop had reached maximum growth. By comparing the photographs over these time periods, the scientists will be able to detect a pattern of parallel streaks, indicating areas that are drying. A clogged drain will cause a break in this pattern.

According to project scientists, the goals of the program are to determine how often to survey, what time of day to survey, how high to fly the plane, what type of sensors to use, and whether to survey when there is bare soil or a crop canopy.

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property

Lease: Deer Park; 3-1-1; fenced area; washer-dryer; deposit \$125; \$355/mo; 483-3473 days; 476-4941 evenings. Ask for Donna.

FOR RENT: CLC/Oakbrook; 3-2-2, lots of trees, \$475 plus deposit. Bill x6136/488-1410.

57.7 acres Houston County. House needs repair. \$1,250. per acre. Assume \$30,000 mortgage. Pay equity. 944-4972 after 6 p.m.

FOR RENT: One furnished bedroom in a 3 bedroom house in Friendswood. 6 mi. from NASA. \$160/mo. including utilities. Conscientious non-smoker only. 482-5393.

RENT: Executive cottage: 1 bdrm. and study on secluded acre, 5 mi. from JSC. Unfurnished. \$375/mo. \$200 deposit. 538-1586 after 4 p.m.

Household

Refrigerator - 30 cu. ft., side by side, older model, good for garage, needs some freon. \$85.00. Norma, x4614/486-8127 evens.

GE gas dryer, very good condition, \$75. x4717 or 534-2117 after 6 p.m.

Round dining table, butcher block top, four chairs, excellent condition \$50. x5951 or 480-3356 after 5 p.m.

Large tub washer & large tub dryer, 1 yr. old, \$350. Bonnie x5844, 339-2604 after 5 p.m.

Cars & Trucks

Camaro parts. Jeff 487-2978.
'77 Ford Pinto Wagon, 4 speed, 4 cyl., a/c, luggage rack, 32,000 miles, exc. cond. \$2750, Larsen x3967 or 538-1477.

'78 Mercury Monarch 6 cy, 250 engine 4 door, exc. cond., 25 mi.-ga. Lady owner, a/c, radio, 483-2693, Eves 923-2375, \$2850.

'79 Honda Accord, 3 door, 36,000 miles, clean, a/c, am/fm, 5 speed, 1762 cc, regular gas. \$5200, 484-1401.

1977 Dodge Charger "SE" fully loaded. PS, PB, AC, Automatic, bucket seats, tilt, am/fm, cruise, door lock. Call Bob Brooks x3417/482-5066.

'74 Plymouth Scamp. 2 dr. hardtop. Slant 6, low miles. Excellent condition. \$1150. 538-1728.

1975 Audi 100ls, 4 dr., very clean, runs great, auto, air am/fm 8 track, \$2,500. 474-2906 after 6 p.m.

Carpools

Need a ride from NASA Road 1, Colonial Garden Apartments, Webster, to JSC, Building 9. x3183 Betty.

I am interested in joining a carpool from the Memorial-Dairy Ashford area. Please contact Marvin Fox, 333-3133.

Would like to form vanpool from I-10 East and Federal Road, and from Metro Park and Ride, I-45, 8:00 to 5:00. Elli Johnson x3841, or Bert Brockman, CSC, 486-8153, x204.

Miscellaneous

King size Fieldcrest Imperial Rose (Foley's) bed spread. 10' round wool early American rug w/4 matching ovals. 482-7073.

SCUBA TANKS, Two fifties, each equipped w/"K" valve and back pack. Hydrostatically checked 8-81. \$55 each. Art Lizza x2673.

Oriental hand embroideries with fine silk thread, unique artist designs. Come & see, Price from \$20. Call 486-1680.

Six interment spaces in Forest Park Cemetery. \$600 under retail. 488-1020.

Shotgun, 20 gauge, Remington, Vent Rib, like new, Kenyon x4593.

Pool table - 8', slate, leather pockets, excellent condition, \$695. 664-4877.

Solid redwood barbeque cart, grill, rotisserie, Temp. ind., 3/8" galv pipe frame. Joe x3576 or 944-7042.

Auto a/c compressor, fits 1970 Chevy Nova, Working good when removed, \$40. Smith, x4468.

Sperti sun lamp, with timer and stand, like new, cost \$75, sell for \$35. Smith x4468.

WANTED: TI 99/4 home computer users for the purpose of exchanging information and software.

EXTRA large dog house, good condition, \$35. 482-0935.

FOR SALE: Huntsman 10' camper and jacks. Sleeps 5. \$1,150. 481-3787.

WANTED: Electric dryer, reasonably priced or will trade Kenmore gas coppertone dryer excellent condition for electric. x2517.

Large, small velvet green swivel/rocker chairs, \$45, \$35, 3 pc. ladies luggage, \$25, 2 pc. mens luggage \$20, Larsen x3967 or 538-1477.

Clothes dryer, elec., Frigidaire, good condition and no problems, 14 yr. old \$35. Call 474-4202 after 6 p.m.

Stuffed chair, green, traditional, excellent condition. \$45. 488-1020.

Heavy duty weight bench. Four positions for back, settings for low and high bar, excellent condition. \$50. 334-3459.

TV & Stereo

Heathkit GR-295 Color TV set, 23-inch tube, solid maple cabinet, works great. \$225. Joe, x3576 or 944-7042.

Audiovox TP-1200 AM/FM 8 track receiver. B/F and L/R balance. 15 watts/channel. \$50. Rick 333-3056 after 5 p.m.

Cycles

HONDA XL-75cc. Like new dirt bike/street legal. \$450. 333-3133.

HONDA XL350 1976. Low miles. Excellent shape. \$825 or best offer. Jim Sherman. Work 486-8153, x307. Nights 334-3058.

HONDA Hobbit Moped, 1978. Low miles, top condition. \$300 or best offer. Jim Sherman. Work 486-8153, x307. Nights 334-3058.

HONDA XL5005, 1981. 65 MPG. Excellent Condition. 482-7906.

Schwinn Continental 10-speed bike. \$45. Joe DeAtkine, x3606 or 488-3866.

Boys' 20-inch bicycle. \$35. Girls' 20 inch bicycle. \$35. Both excellent condition. 488-1028.

Pets

AKC Reg. Black male toy Poodle, 4 yrs old. \$75. Joe x3576 or 944-7042.

Pekingese, two 5 mo. old female puppies. George D. x2931/486-8054. \$100 each.

Beautiful gray male cockatiel. Very tame and gentle - loves to be petted and sings beautifully. Custom designed brass/plexiglass cage. \$135. x4393 or 488-0559.

Musical

1980 Kimball organ "The Entertainer" 11 rhythms, one octave of bass pedals, automatic chord system, reverb & vibrato. Dual key boards of 3 octaves each plus accessories. \$650 after 5, 333-3056.

Drums, Ludwig, 6-pc. blue oyster-pearl, with Zildjian cymbals, high hat, stand, stool, boom, & mike. Good condition. 933-1024.

Boats & Planes

Piper Cherokee 140 for rent. \$32/hr/wet. Located at LaPorte Gulf Central. Call L. York x2657.

Voyager Discoveries Fire Debate Over Jupiter Moons

Unexpected discoveries about Ganymede and Callisto, Jupiter's largest moons, have triggered debate over their origins and development.

Scientists believed the sibling satellites would look alike, equally devoid of atmosphere or activity except for craters left from meteorite bombardment.

However, Voyagers 1 and 2 in their 1979 flybys of Jupiter have unveiled a surprisingly different, bimodal face on Ganymede, apparently the result of internal heating, which contrasts with Callisto's uniformly cratered surface. How did Ganymede experience this heating which reworked her surface, when Callisto did not?

"If we could find the answer to this question," says Patrick Cassen, a researcher at NASA's Ames Research Center, Mountain View, Calif., "it would tell us a lot about planetary formation and evolution in general. Ganymede and Callisto have a relationship much like that of Earth and Venus, for example. Both began as similar bodies but evolved into planets with different characteristics because of very subtle differences in them or their environments." Before the Voyagers' trips to Jupiter, early studies had established that Ganymede and Callisto were composed primarily of water and rock particles, frozen because surrounding temperatures remain below the melting point of ice.

Ganymede, though Jupiter's largest satellite — about 1-1/2 times the size of our Moon — is only slightly larger than Callisto and occupies an adjacent orbit around Jupiter. Thus, Ganymede was expected to look like Callisto.

Voyager pictures show that Callisto is, as predicted, a frozen, pock-marked sphere without atmosphere or evidence of internal activity. In fact, scientists have found that Callisto holds more craters than any other body in our solar system. The craters are remnants from four billion years ago, when meteors showered through our forming solar system.

But in Voyager images, this ancient terrain, found on both Ganymede and Callisto, appears dark and dull, not bright. And parts of Ganymede's surface are light and covered with grooves which seem to overlap the

older terrain. These finds have sparked debate among scientists.

The darkness of this cratered ground seems to come from contamination of the ice. Some scientists believe a uniform mixture of rock and ice frozen together, with rock particles in the ice, is responsible for the darkness. Others advocate a two-layer model, with an ice shell encasing a rocky center with the darkened surface caused by collected dust and cosmic particles.

And the brighter terrain, according to Cassen, "is probably a younger surface. This second surface was most likely caused by internal heating which might have melted or weakened the ice, producing flow, grooves and overlap as we see."

Three likely sources of this extra heating which changed Ganymede's face, according to NASA Ames scientists Cassen and Ray Reynolds and Stanton Peale of the University of California at Santa Barbara, are formational heat, radioactive energy and tidal dissipation. These researchers believe the radioactive effect was the most important heating factor, despite controversy.

Formational heat is the heat which all planetary bodies release as they form. If Ganymede formed faster it would have retained more heat energy, making it warmer.

Ganymede also experiences stronger radioactive heating as it contains more rock. (All rock radiates energy from radioactive decay. More rock will therefore mean more radioactive heating).

In fact, Ganymede's core, if it exists, is estimated to be about 50 percent larger than Callisto's. This difference could have provided up to 400 million years' worth of additional heat flow in Ganymede.

Tidal heating could also have prolonged the initial hot period on Ganymede. Tidal heating is the energy created by the squash and stretch satellites experience because they do not orbit in perfect circles.

Scientists hope that the Galileo Orbiter, scheduled to rendezvous with Jupiter in 1989, will pass close enough to these two satellites to provide information that will further improve these theories.



Jupiter's Major Moons

The four planet-sized moons surrounding Jupiter, called Galilean satellites, were photographed individually by Voyager 1 and assembled into this collage. Not to scale, but in their relative positions are Io (upper left), Europa, (center), Ganymede and Callisto (lower right). Jupiter's nine other moons are not shown.

Nicollier to Continue Mission Specialist Work

The European Space Agency announced last week that one of three European payload specialists who had been preparing for the first flight of the NASA/European Spacelab in 1983 has been reassigned to other duties.

Dr. Claude Nicollier of Switzerland was one of five scientists picked in 1978 to operate the experiment equipment aboard Spacelab 1. He and fellow Europeans Dr. Wubbo Ockels and Dr. Ulf Merbold, together with American scientists Dr. Michael Lampton and Dr. Byron Lichtenberg, began a one-year hiatus from this training in summer 1980 because of a delay in the launch date. During this pause, Nicollier and Ockels underwent NASA astronaut mission specialist training at JSC.

While Spacelab training has resumed, ESA announced that it would leave Nicollier at JSC to "continue his dedicated training as mission specialist with a view to obtaining full capacity in this field for future Shuttle missions carrying European payloads." Ockels and Merbold will continue Spacelab training along with the two Americans. One American and one European will eventually be identified to fly. The other two payload specialists will operate ground-based equipment and support the pair on orbit.

Spacelab 1 is to be a joint American-European mission using the European-built Spacelab facility aboard a NASA Space Shuttle. The first three missions are being managed by NASA's Marshall Space Flight Center, Huntsville, Ala., which is responsible for payload specialist training.

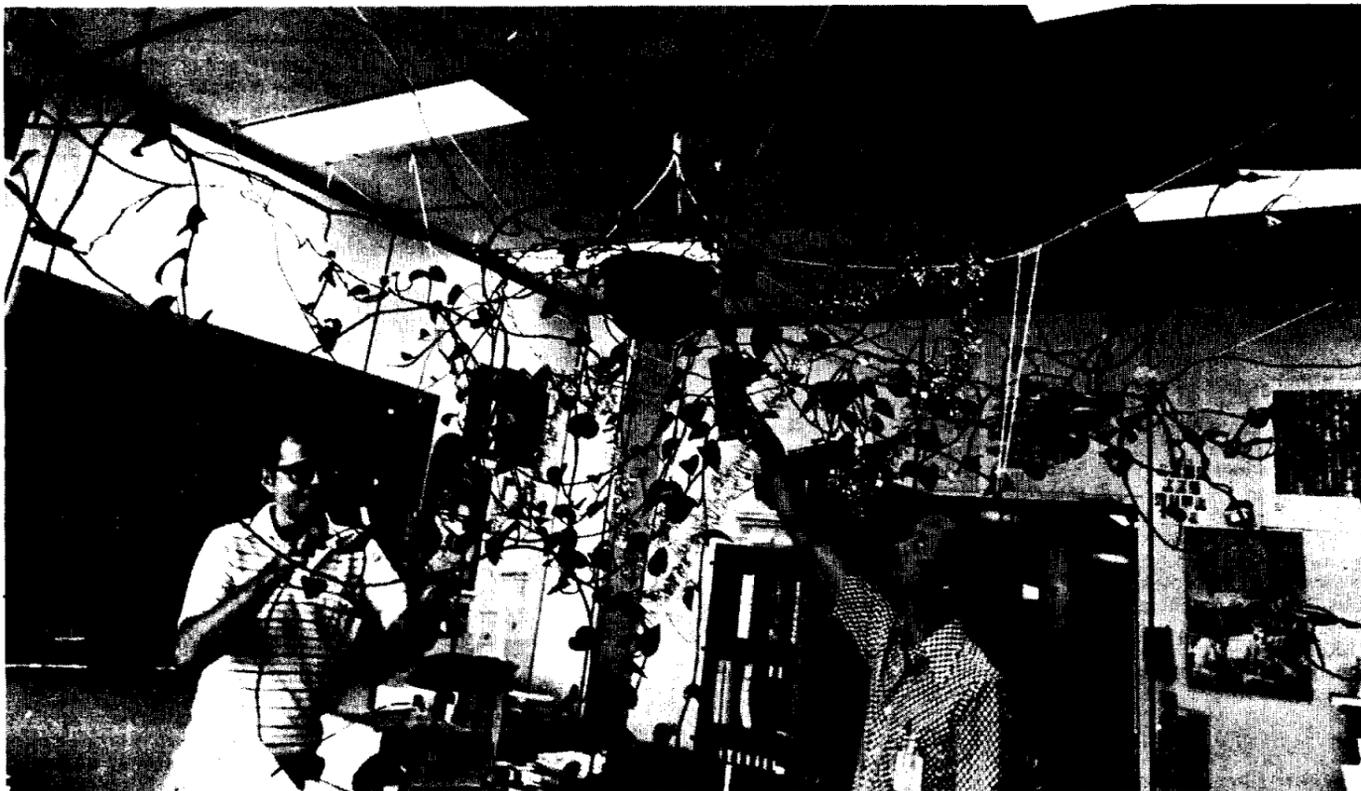
NASA Comptroller Lilly to Retire

William E. Lilly, NASA's first Comptroller, will retire in early October after more than 37 years of federal service, the last 21 with NASA.

Lilly joined NASA in February 1960 as Chief, Plans and Analysis, Office of Launch Vehicles, and in 1961 became Director of Program Control for the Office of Manned Space Flight. He became Assistant Administrator for Administration in March 1967 and was named to his present post as Associate Administrator/Comptroller in January 1973.

Before joining NASA, Lilly was Assistant to the Director, Plans and Programs, Special Projects Office, Department of the Navy from 1956 to 1960, where he was a key contributor to the Polar Weapons Systems development.

He was Deputy Budget Officer at the National Bureau of Standards from 1954 to 1956; head of Estimate and Analysis Section at the Navy Bureau of Ordnance from 1952 to 1954; and a budget and program analyst with the Navy Ordnance Test Station, Calif., from 1950 to 1952.



Starting all over again

Five years ago this philodendron was an everyday run-of-the mill plant on a desktop. But over the years, with the help of weekly waterings and Schultz plant food, the philodendron made room 124 a landmark in Building four. Milton Heflin is shown here watering the plant while Jerry Pfleeger inspects a tag marked "STS-1." Periodic tagging of the plant marked its constant growth. The plant was reduced to its original size last Friday when Heflin and Pfleeger printed "free plant clippings-today only" sign outside their office. The two are moving to another office where they plan to start the project over again. The plant has been repotted three times and at one time had vines over 35 feet long. Clippings of the plant are being rooted all over Building four.